

IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims

1-21. (Canceled).

22. (New) An OFDM-CDMA transmission apparatus comprising:

a first spreader that carries out spreading processing on a plurality of transmission signals using different spreading codes respectively;

a second spreader that carries out spreading processing on a known signal at a predetermined spreading factor using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal and transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously.

23. (New) The OFDM-CDMA transmission apparatus according to claim 22, wherein the known signal that is spreading processed by said second spreader has a higher signal level than the transmission signals.

24. (New) An OFDM-CDMA reception apparatus comprising:  
a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor;

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

the transmission signals and the known signal are transmitted simultaneously;

a first demodulator that carries out despreading processing on the signal received by the receiver using predetermined spreading codes and extracts received versions of the transmission signals;

a second demodulator that carries out despreading processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

25. (New) A communication terminal apparatus equipped with an OFDM-CDMA transmission apparatus and an OFDM-CDMA reception apparatus, wherein:

said OFDM-CDMA transmission apparatus comprises:

a first spreader that carries out spreading processing on a plurality of transmission signals using different spreading codes respectively;

a second spreader that carries out spreading processing on a known signal at a predetermined spreading factor using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal and transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously; and  
said OFDM-CDMA reception apparatus comprises:

a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor;

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

the transmission signals and the known signal are transmitted simultaneously;

a first demodulator that carries out despread processing on the signal received by the receiver using predetermined spreading codes and extracts received versions of the transmission signals;

a second demodulator that carries out despread processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

26. (New) A base station apparatus equipped with an OFDM-CDMA transmission apparatus and an OFDM-CDMA reception apparatus, wherein:

said OFDM-CDMA transmission apparatus comprises:

a first spreader that carries out spreading processing on a plurality of transmission signals using different spreading codes respectively;

a second spreader that carries out spreading processing on a known signal at a predetermined spreading factor using a spreading code that is different from said spreading codes;

a frequency division multiplexer that breaks down the known signal after the spreading processing by the second spreader into individual chips and subjects the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency

axis direction, the number of said subcarriers matching said spreading factor, and subjects the transmission signals after the spreading processing by the first spreader to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

a transmitter that transmits the known signal and transmission signals, assigned to the subcarriers by the frequency division multiplexer, simultaneously; and said OFDM-CDMA reception apparatus comprises:

a receiver that receives a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor;

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

the transmission signals and the known signal are transmitted simultaneously;

a first demodulator that carries out despreading processing on the signal received by the receiver using predetermined spreading codes and extracts received versions of the transmission signals;

a second demodulator that carries out despreading processing on the signal received by the receiver using the spreading code assigned to the known signal and extracts a received version of the known signal;

a phase error detector that detects a residual phase error using the known signal and the received version of said known signal; and

a phase compensator that carries out phase compensation on the received versions of the transmission signals using the detected residual phase error.

27. (New) A transmission method comprising:

first spreading processing a plurality of transmission signals using different spreading codes respectively;

second spreading processing a known signal at a predetermined spreading factor using a spreading code that is different from said spreading codes;



breaking down the known signal, after the second spreading processing, into individual chips;

subjecting the known signal chips to frequency division multiplexing by assigning said known signal chips to subcarriers aligned in a frequency axis direction, the number of said subcarriers matching said spreading factor;

subjecting the transmission signals, after the first spreading processing, to frequency division multiplexing by assigning said transmission signals to said subcarriers; and

transmitting the known signal and transmission signals, assigned to the subcarriers by frequency division multiplexing, simultaneously.

28. (New) A reception method comprising:

receiving a signal in which:

a plurality of transmission signals and a known signal are subjected to spreading processing at a predetermined spreading factor using different spreading codes respectively;

the known signal after the spreading processing is broken down into individual chips and the known signal chips are subjected to frequency division multiplexing and are assigned to subcarriers aligned in a frequency axis

direction, the number of said subcarriers matching said spreading factor;

the transmission signals after the spreading processing are subjected to frequency division multiplexing and assigned to said subcarriers; and

the transmission signals and the known signal are transmitted simultaneously;

despreading the signal received by the receiver using predetermined spreading codes and extracting received versions of the transmission signals;

despreading the signal received by the receiver using the spreading code assigned to the known signal and extracting a received version of the known signal;

phase error detecting a residual phase error using the known signal and the received version of said known signal; and

phase compensating the received versions of the transmission signals using the detected residual phase error.